

ELECTRODES ON A PHOTOCONDUCTIVE SUBSTRATE FOR GENERATION AND  
DETECTION OF TERAHERTZ RADIATION

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The present invention relates to the field of antennas for receiving and/or transmitting radiation and methods for operating such antennas. More specifically, the present invention relates to the field of antennas which operate in the frequency range colloquially referred to as the TeraHertz frequency range, the range being that from 25GHz to 100THz, particularly that in the range of 50GHz to 84THz, more particularly that in the range from 90 GHz to 50 THz and especially that in the range from 100GHz to 20THz.

Such radiation is non-ionising and, as a result, it is particularly of use in medical applications.

Terahertz radiation may be generated or detected using so-called photoconductive antennas, which comprise two electrodes provided on the surface of a photoconductive substrate. To generate radiation such an antenna may be excited by directing a pulse onto such a device. When a bias is applied to the electrodes, a photogenerated current flows between the electrodes with transients radiating in broadband with frequencies up to the THz range.

Alternatively, the device may be irradiated using two CW lasers of slightly different frequencies. When biased, the non-linear I-V characteristics of the device leads to photomixing of the two CW lasers and reradiation at the difference of their different frequencies. This allows the antenna to output frequencies up to the 1 to 3 THz range.

For detection, the antenna may be excited by irradiating the antenna with a pulse or two CW lasers of differing frequencies. This exciting radiation is incident on the antenna side of the photoconducting substrate, the THz radiation which is to be detected is incident on the opposing side of the photoconductive substrate. When both the